

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference PHNL030638WO	FOR FURTHER ACTION	See item 4 below
International application No. PCT/IB2004/050810	International filing date (<i>day/month/year</i>) 01 June 2004 (01.06.2004)	Priority date (<i>day/month/year</i>) 11 June 2003 (11.06.2003)]
International Patent Classification (IPC) or national classification and IPC 7 H04L 27/26, 25/02		
Applicant KONINKLIJKE PHILIPS ELECTRONICS N.V.		

1.	This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).																								
2.	This REPORT consists of a total of 9 sheets, including this cover sheet. In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.																								
3.	<p>This report contains indications relating to the following items:</p> <table style="width: 100%;"> <tr> <td style="width: 10%; text-align: center;"><input checked="" type="checkbox"/></td> <td style="width: 30%;">Box No. I</td> <td style="width: 60%;">Basis of the report</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>	<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input checked="" type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input checked="" type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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<input type="checkbox"/>	Box No. VIII	Certain observations on the international application																							
4.	The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).																								

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Date of issuance of this report 13 December 2005 (13.12.2005)
Facsimile No. +41 22 740 14 35	Authorized officer <div style="text-align: center; font-weight: bold;">Idhir Britel</div>
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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

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To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Applicant's or agent's file reference see form PCT/ISA/220		Date of mailing (day/month/year) see form PCT/ISA/210 (second sheet)	
International application No. PCT/IB2004/050810		International filing date (day/month/year) 01.06.2004	Priority date (day/month/year) 11.06.2003
International Patent Classification (IPC) or both national classification and IPC H04L27/26, H04L25/02			
Applicant KONINKLIJKE PHILIPS ELECTRONICS N.V.			

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application


2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:		Authorized Officer	
 <p>European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016</p>		<p>Koukourlis, S</p> <p>Telephone No. +31 70 340-2285</p>	



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/IB2004/050810

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material:
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing:
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/B2004/050810

Box No. II Priority

1. ☒ The following document has not been furnished:

- ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).
- ☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	6
	No: Claims	1-5,7-10
Inventive step (IS)	Yes: Claims	
	No: Claims	1-10
Industrial applicability (IA)	Yes: Claims	1-10
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43*bis*.1 and 70.10)

and / or

2. Non-written disclosures (Rules 43*bis*.1 and 70.9)

see form 210

Re Item V.

1 The following documents are referred to in this communication:

- D1: WO 03/028270 A (ATHEROS COMM INC) 3 April 2003 (2003-04-03)
- D2: US 2002/159533 A1 (CRAWFORD JAMES A) 31 October 2002 (2002-10-31)
- D3: PATENT ABSTRACTS OF JAPAN vol. 2000, no. 13, 5 February 2001 (2001-02-05) & JP 2000 286819 A (NEC CORP; NIPPON TELEGR & TELEPH CORP <NTT>), 13 October 2000 (2000-10-13)
- D4: EP-A-1 349 337 (TOKYO SHIBAURA ELECTRIC CO) 1 October 2003 (2003-10-01)

2 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-5 and 7-10 is not new in the sense of Article 33(2) PCT.

Using the wording of claim 1 (similarly, claim 8) and references from document D1, document D1 discloses:

a receiver for a multi-carrier communication system, the receiver being arranged for receiving training pilot carriers during a training symbol preceding data symbols comprising data carriers and data pilot carriers (see figure 3), the receiver comprising
a correction unit (see figure 6, ref. 422) for supplying, under control of a control signal, a corrected signal comprising information on the data carriers being corrected for a common amplitude error and/or common phase error (see page 16, paragraph 2),
a quality determination unit (see figure 6, ref. 620) for determining which ones of the training pilot carriers occurring at positions of the data pilot carriers fulfill a predetermined quality criterion (see paragraph bridging pages 15 and

16), and

a control unit (see figure 6, ref. 620) for supplying the control signal being dependent on an amplitude and/or phase of the data pilot carriers of which corresponding training pilot carriers fulfill the predetermined quality criterion, and not on the data pilot carriers of which corresponding training pilot carriers do not fulfill the predetermined quality criterion.

According to the description of the present application (see page 8, paragraph 2; see page 12, paragraph 3), the residual frequency offset is responsible for the common phase error CPE. The same frequency offset is compensated for in D1, and therefore, correction of the common amplitude error and/or common phase error is implicitly disclosed in D1.

Therefore, the subject-matter of claims 1 and 8 is not new.

D1 also discloses that the control unit is arranged for averaging the amplitude and/or phase of the data pilot carriers of which the corresponding training pilot carriers fulfill the predetermined quality criterion to provide an estimate for a common amplitude error and/or a common phase error (see page 15, paragraph 3).

D1 also discloses that the control unit is arranged for performing said averaging for each data symbol (see page 15, paragraph 3, where averaging over the four data pilot carriers is disclosed).

Therefore, the subject-matter of claims 2 and 3 is not new.

An FFT circuit for supplying the data symbol is disclosed in D1 (see figure 6), where the corrected signal represents a phase and amplitude of the data carriers.

D1 also discloses that the quality determination unit is arranged for comparing an amplitude of the training pilot carriers with a reference amplitude, a particular one of the training pilot carriers fulfilling the predetermined quality criterion only if its amplitude is higher than the reference amplitude (see paragraph bridging pages 15 and 16).

Therefore, the subject-matter of claims 4 and 5 is not new.

The subject-matter of claims 7, 9 and 10 (OFDM, (wireless) multi-carrier system and transmitter) is disclosed in D1 (see pages 1-2).

Therefore, the subject-matter of claims 7, 9 and 10 is not new.

- 3 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 6 does not involve an inventive step in the sense of Article 33(3) PCT.

The subject-matter of claim 6 relates to a quality criterion based on the a comparison of the phase of each training pilot carrier with an average value of their phase.

The problem solved by this feature is not clearly evident form the description of the present application, for the reasons which follow; therefore no inventive step can be attributed.

The description mentions on page 5, paragraph 2, that data pilot carriers corresponding to training pilot carriers which do not fulfill the quality criterion of claim 6, may or may not be excluded from use for the estimation of the common errors. No specific receiving conditions under which the inclusion or exclusion is desired are disclosed and therefore, no advantage can be seen as a result of the feature of claim 6.

- 4 Also Document D3 can be used to show lack of novelty (Article 33(2) PCT) of claims 1-5 and 7-10.

Using the wording of claim 1 (similarly, claim 8) and references from document D3, document D3 discloses:

a receiver for a multi-carrier communication system, the receiver being arranged for receiving training pilot carriers during a training symbol preceding data symbols comprising data carriers and data pilot carriers (see figure 3), the receiver comprising

a correction unit (see paragraph 20; see figures 1 and 2, ref. 8) for supplying, under control of a control signal, a corrected signal comprising information on the data carriers being corrected for a common amplitude error and/or common phase error,

a quality determination unit (see paragraph 18; see figures 1 and 2, ref. 11) for determining which ones of the training pilot carriers occurring at positions of the data pilot carriers fulfill a predetermined quality criterion, and
a control unit (see paragraph 18; see figures 1 and 2, ref. 11) for supplying the control signal being dependent on an amplitude and/or phase of the data pilot carriers of which corresponding training pilot carriers fulfill the predetermined quality criterion, and not on the data pilot carriers of which corresponding training pilot carriers do not fulfill the predetermined quality criterion.

Therefore, the subject-matter of claims 1 and 8 is not new.

As for the dependent claims, D3 discloses averaging for each data symbol the amplitude and/or phase of the data pilot carriers (see paragraph 19; figure 2, ref. 13), an FFT circuit (see figures 1 and 2, ref. 7), and comparing the amplitude of the training pilot signals with a reference amplitude (see paragraphs 17-18) in a (wireless) OFDM communication system comprising a transmitter.

Therefore, the subject-matter of claims 2-5, 7, 9 and 10 is not new.

5 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-10 does not involve an inventive step in the sense of Article 33(3) PCT.

In Document D2 a system is disclosed which uses the same frame structure as the system of the present application (see figure 2) and which also compensates for phase errors via a pilot tracking loop (see claim 1).

In contrast to the present application, D2 calculates a phase error relative to pilot reference points for all of the pilots of the OFDM symbols (see paragraph 86).

Document D1 acknowledges that some data pilots may be of better quality than others (i.e. of higher SNR (or amplitude) or less phase variance).

However, according to D1, by making use of all the pilots a more accurate picture of the signal phase across the OFDM symbol is estimated such that the phase contribution due to the multipath and also introduced by the LO of the OFDM radios (which leads to common phase error) can be minimized.

The present application states that a better estimation of common errors is obtained, if certain data pilots, with corresponding training pilots on which fading occurs, are excluded, based on a quality criterion which is related either to the amplitude of the training pilots or to the difference of their phase from the average phase value.

However, no special conditions under which such an advantage exists are disclosed.

Therefore, in the light of document D2, no inventive step can be attributed to the subject-matter of claims 1-10.

6 The European Patent Application EP 1 349 3337 (D4) published on 01.10.2003 with filing date 25.03.2003 claims the priority date of 26.03.2002. This document is referred to by virtue of Rule 64.3 PCT (see Rule 70.10 PCT).